WHAT IS CLAIMED IS:

1. A knock control apparatus for a multi-cylinder internal combustion engine, comprising:

a fuel injection timing changing device that changes a fuel injection timing in each cylinder based on an operating state of the engine;

a knock determining device that makes a knock determination for each cylinder based on an output signal from a knock sensor during a knock determination period corresponding to each cylinder;

an engine control amount changing device that changes an engine control amount based on determination results of the knock determination; and

a prohibiting device that prohibits execution of the knock determination when a fuel injection period in a first cylinder overlaps with the knock determination period corresponding to a second cylinder.

2. The knock control apparatus according to claim 1, wherein the engine control amount is an ignition timing.

3. The knock control apparatus according to claim 1, wherein the knock determination is made based on a comparison between i) a background level obtained based on the output signal from the knock sensor during the knock determination period in the knock determinations up until the last time, and ii) the output signal from the knock sensor during the knock determination period in the knock determination this time.

4. The knock control apparatus according to claim 1, wherein the internal combustion engine is an in-cylinder injection internal combustion engine.

5. A knock control apparatus for a multi-cylinder internal combustion engine, comprising:

a fuel injection timing changing device that changes a fuel injection timing in each cylinder based on an operating state of the engine;

a knock determining device that makes a knock determination for each cylinder based on an output signal from a knock sensor during a knock determination period corresponding to each cylinder;

an engine control amount changing device that changes an engine control amount based on determination results of the knock determination; and

a prohibiting device that prohibits a change in the engine control amount based on the determination results when a fuel injection period in a first cylinder and the knock determination period corresponding to a second cylinder overlap.

6. The knock control apparatus according to claim 5, wherein, when the fuel injection period in the first cylinder and the knock determination period corresponding to the second cylinder have switched from a state in which they do not overlap to a state in which they do overlap, the prohibiting device prohibits a change in the engine control amount based on the determination results from after the switch until a predetermined period of time has passed.

7. The knock control apparatus according to claim 5, further comprising:

a learning device that learns a knock limit value for the engine control amount based on the determination results; and

a setting device that sets the engine control amount to a side of the knock limit value where knock is less apt to occur based on the knock limit value learned by the learning device, when a change in the engine control amount based on the determination results is prohibited by the prohibiting device.

8. The knock control apparatus according to claim 7, wherein the learning device learns the knock limit value for the engine control amount by obtaining, based on the determination results, a learning value for learn-correcting the knock limit value of the engine control amount.

9. The knock control apparatus according to claim 7, wherein the engine control amount is an ignition timing, the knock limit value is a knock limit ignition timing, and the setting device sets the engine control amount to a retard side of the knock limit ignition timing based on the knock limit ignition timing learned by the learning device, when a change in the engine control amount is prohibited by the prohibiting device based on the determination results.

10. The knock control apparatus according to claim 5, wherein the engine control

amount is an ignition timing.

11. The knock control apparatus according to claim 5, wherein the knock determination is made based on a comparison between i) a background level obtained based on the output signal from the knock sensor during the knock determination period in the knock determinations up until the last time, and ii) the output signal from the knock sensor during the knock determination period in the knock determination this time.

12. The knock control apparatus according to claim 5, wherein the internal combustion engine is an in-cylinder injection internal combustion engine.

13. A knock control method for a multi-cylinder internal combustion engine, comprising the steps of:

changing a fuel injection timing in each cylinder based on an operating state of the engine;

making a knock determination for each cylinder based on an output signal from a knock sensor during a knock determination period corresponding to each cylinder;

changing an engine control amount based on determination results of the knock determination; and

prohibiting execution of the knock determination when a fuel injection period in a first cylinder overlaps with the knock determination period corresponding to a second cylinder.

14. The knock control method according to claim 13, wherein the engine control amount is an ignition timing.

15. The knock control method according to claim 13, wherein the knock determination is made based on a comparison between i) a background level obtained based on the output signal from the knock sensor during the knock determination period in the knock determinations up until the last time, and ii) the output signal from the knock sensor during the knock determination period in the knock determination this time.

16. A knock control method for a multi-cylinder internal combustion engine, comprising the steps of:

changing a fuel injection timing in each cylinder based on an operating state of the engine;

making a knock determination for each cylinder based on an output signal from a knock sensor during a knock determination period corresponding to each cylinder;

changing an engine control amount based on determination results of the knock determination; and

prohibiting a change in the engine control amount based on the determination results when a fuel injection period in a first cylinder and the knock determination period corresponding to a second cylinder overlap.

17. The knock control method according to claim 16, wherein, when the fuel injection period in the first cylinder and the knock determination period corresponding to the second cylinder have switched from a state in which they do not overlap to a state in which they do overlap, the prohibiting device prohibits a change in the engine control amount based on the determination results from after the switch until a predetermined period of time has passed.

18. The knock control method according to claim 17, further comprising the steps of:

learning a knock limit value for the engine control amount based on the determination results; and

setting the engine control amount to a side of the knock limit value where knock is less apt to occur based on the learned knock limit value, when a change in the engine control amount is prohibited based on the determination results.

19. The knock control method according to claim 18, wherein a learning value for learn-correcting the knock limit value for the engine control amount is obtained based on the determination results.

20. The knock control method according to claim 18, wherein the engine control amount is an ignition timing, the knock limit value is a knock limit ignition timing, and the engine control amount is set to a retard side of the knock limit ignition timing based on the learned knock limit ignition timing when a change in the engine control amount based on the determination results is prohibited.

21. The knock control method according to claim 16, wherein the engine control amount is an ignition timing.

22. The knock control method according to claim 16, wherein the knock determination is made based on a comparison between i) a background level obtained based on the output signal from the knock sensor during the knock determination period in the knock determinations up until the last time, and ii) the output signal from the knock sensor during the knock determination period in the knock determination this time.